Reg. No. : | | | | | | | | | | |

Question Paper Code: 41145

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fourth Semester

Civil Engineering

01UCE405 - APPLIED HYDRAULIC ENGINEERING

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Write down the Reynolds number for laminar flow and turbulent flow.
2. Write down the characteristics of boundary layer.
3. Define hydraulic depth of an open channel flow.
4. Differentiate uniform and non uniform flow in open channel with sketch.
5. Define alternate depths in an open channel.
6. Draw and explain back water curve for open channels.
7. Define Cavitation.
8. Illustrate what are the salient points to be considered while selection of hydraulic turbine for hydroelectric power plant.
9. Give example for Impulse turbine and Reaction turbine.
10. Define the term negative slip of reciprocating pump.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expression for finding momentum. (16)

Or

(b) A horizontal pipe line 40 *m* long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 *m* of its length from the tank, the pipe is 150 *mm* diameter and its diameter is suddenly enlarged to

300 *mm*. The height of water level in the tank is 8 *m* above the centre of the pipe. Considering all losses of head, determine the rate of the flow. (16)

12. (a) A trapezoidal channel is required to carry *8* m^3*/sec* of the water at a velocity of 2 *m/s*. Find the most economical cross section if the channel has side slopes 1 horizontal to 2 vertical. For the same discharge what amount of saving in power would result if this trapezoidal section is replaced by a rectangular section 1.5 *m* deep and 4 *m* wide? Take Chezy's constant $C = 55$. (16)

Or

(b) A trapezoidal canal has side slopes 3 *H* to 4 *V* and slope of its bed 1 in 2000. Determine the optimum dimensions of the canal, if it has to carry water at 0.5m^3*/s*. (16)

13. (a) A wide channel laid to a slope of 1 in 1000 carries a discharge of 3.5 m^3*/sec per meter* width at a depth of 1.6 *m*. Find out the value of Chezy's constant C. Consider the flow to be uniform. If the actual depth various from 1.5 *m* at an upstream location to 1.7 *m* at a location 300 *m* downstream or in other words the flow is gradually varied. What will be the value of Chezy's constant. (16)

Or

(b) The depth of flow of water at a certain section of a rectangular channel of 2*m* wide is 0.3*m*. The discharge through the channel is 1.5 m^3*/s*. Determine whether the hydraulic jump will occur or not. If so, find its height, loss of energy per kg of water and power lost. (16)

14. (a) (i) Write the various classifications of turbines. (8)

(ii) Define draft tube. Explain the various types of draft tubes with sketches. (8)

Or

(b) Design a Pelton wheel. The following data relate to a Pelton wheel: head, speed of the wheel, shaft power of the wheel, speed ratio, coefficient of velocity and overall efficiency are 72 *m*, 240 *r.p.m*, 115 *kW*, 0.45, 0.98 and 58% respectively. (16)

15. (a) (i) Draw a neat sketch of centrifugal pump and explain the working principle of the centrifugal pump. (10)

(ii) Explain briefly about priming in pump. (6)

Or

(b) Explain how are the reciprocating pumps are classified. Describe the principle and working procedure of a reciprocating pump. (16)

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